

REMARKS/ARGUMENTS

Favorable reconsideration of this application in view of the above amendments and in light of the following discussion is respectfully requested.

Claims 1-6 and 8-21 are pending, with Claims 11-18 and 20 withdrawn from consideration. The present Amendment amends Claims 1, 2, 8-10, 19, and 21, and cancels Claim 7 without prejudice or disclaimer. No new matter is added.

In the outstanding Office Action, Claims 1-7, 10 and 19 were rejected under 35 U.S.C. § 102(b) as anticipated by Fairbairn (U.S. Patent No. 5,838,121); and Claims 8, 9, and 21 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fairbairn in view of Lee (U.S. Patent No. 6,086,679).

Independent Claims 1, 2, 19 and 21 are amended to clarify the subject matters of the present invention. These amendments find support in the specification as originally filed at page, 12 lines 12-18 and page 22, line 21 to page 23, line 7, for example. Therefore, the amendments to Claims 1, 2, 19, and 21 do not raise a question of new matter.

The present invention relates to a processing apparatus including a processing chamber performing therein a process on a substrate to be processed. In particular, independent Claim 1 is directed to a processing apparatus including a plurality of processing chambers for processing therein a substrate to be processed. The process apparatus also includes a plurality of shower heads, installed at upper parts of the processing chambers, for providing a gas to be converted into a plasma in the processing chambers. Claim 1 further recites a monatomic nitrogen atom supply unit for providing dissociated monatomic nitrogen atoms in the processing chambers. The monatomic nitrogen atoms are provided in one of the processing chambers after finishing processing the substrate therein to remove charge on the electrostatic chuck provided in the processing chamber. Further, the monatomic nitrogen atom supply unit includes a pipe communicating with each processing chamber through a

sidewall of each processing chamber, an N₂ gas supply source for supplying an N₂ gas through the pipe, and an energy supply unit for applying energy to the N₂ gas in the pipe to convert the N₂ gas into the dissociated monatomic nitrogen atoms.

Independent Claims 2 and 19 are also directed to a process apparatus. Each of independent Claims 2 and 19 recite, *inter alia*:

a shower head, installed at an upper part of the processing chamber, for providing a gas to be converted into a plasma in the processing chamber...

...a monatomic nitrogen atom supply unit for providing dissociated monatomic nitrogen atoms in the processing chamber...

wherein the monatomic nitrogen atom supply unit includes a pipe communicating with the processing chamber through a sidewall of the processing chamber, an N₂ gas supply source for supplying an N₂ gas through the pipe, and an energy supply unit for applying energy to the N₂ gas in the pipe to convert the N₂ gas into the dissociated monatomic nitrogen atoms.

Independent Claim 21 recites a process apparatus which includes a shower head, installed at an upper part of the processing chamber, for providing a gas to be converted into a plasma in the processing chamber. The process apparatus includes a means for providing dissociated monatomic atoms that includes a pipe communicating with a process chamber through a sidewall of the process chamber.

In the present invention, since the pipe for supplying the N₂ gas into the processing chamber therethrough communicates with the processing chamber through the *sidewall* of the processing chamber not the *upper portion* thereof, the upper portion of the processing chamber is structurally simple. Therefore, the entire processing apparatus can be made easily. Further, since the monatomic nitrogen atoms remove the charge on the electrostatic chuck without incurring damage to the substrate, the present invention ensures excellent accuracy and throughput.

Turning to the applied references, Fairbairn describes an apparatus for concurrent processing of multiple wafers in the fabrication of integrated circuits. Figures 23 and 24

illustrate a remote clean module (800) connected to a process chamber (106). The clean module (800) includes a source of a precursor gas (804), a remote activation chamber (806) which is located outside of a processing chamber (106), a power source (808) for activating the precursor gas within the remote activation chamber, an electronically operated valve and flow control mechanism (810), and a conduit or pipe (812) connecting the remote chamber to the processing chamber via a conduit (811).¹ However, Fairbairn does not describe a *monatomic nitrogen atom* supply unit that includes a pipe communicating with a processing chamber through a *sidewall* of the processing chamber, an N₂ gas supply source for supplying an N₂ gas through the pipe, and an energy supply unit for applying energy to the N₂ gas in the pipe to convert the N₂ gas into dissociated monatomic nitrogen atoms. As can be seen in Figure 24, the conduit (811) communicates with the *upper portion* of the processing chamber (106). Thus, Fairbairn does not disclose a pipe communicating with a processing chamber through a *sidewall* of the processing chamber and monatomic nitrogen atoms provided in the chamber.

Accordingly, as Fairbairn does not disclose or suggest the features of amended independent Claims 1, 2, or 19, it is submitted that amended independent Claims 1, 2, and 19, and the claims depending therefrom, are in condition for allowance.

Lee fails to cure the deficiencies discussed above with respect to Fairbairn. Lee describes a transport polymerization system for preparing polymer thin film. In particular, Figure 6 of Lee illustrates a schematic diagram of a transport polymerization system (600) employing RF to generate a plasma.² Precursors are transported via a pipe (616) into a plasma tube (620).³ The precursors are exposed to RF energy generated by a RF generator (626), through a coil (628), and a plasma (630) is thereby generated.⁴ The plasma (630) then

¹ See Fairbairn, at col. 18, lines 16-24.

² See Lee, at col. 24, lines 65-66.

³ See Lee, at col. 24, line 66 to col. 25, line 4.

⁴ See Lee, at col. 25, lines 5-7.

flows into a deposition chamber (634).⁵ However, Lee fails to disclose or suggest a means for providing *dissociated monatomic atoms* that includes a pipe communicating with a process chamber through a *sidewall* of the process chamber. As can be seen in Figure 6, the plasma tube (620) communicates with the *upper portion* of the deposition chamber (634). Thus, Lee does not disclose a pipe communicating with a chamber through a *sidewall* of the chamber and monatomic nitrogen atoms provided in the chamber.

Accordingly, even the combined teachings of Fairbairn and Lee fail to disclose or suggest the features of independent Claim 21. It is submitted that independent Claim 21 is in condition for allowance.

With respect to the rejection of dependent Claims 8 and 9 as obvious over Fairbairn in view of Lee, Lee fails to cure the deficiencies in Fairbairn discussed above with respect to amended Claim 2. Specifically, Lee fails to disclose or suggest a *monatomic nitrogen atom* supply unit that includes a pipe communicating with the processing chamber through a *sidewall* of the processing chamber. Accordingly, it is submitted that dependent Claims 8 and 9 are in condition for allowance for at least the same reasons as amended Claim 2, from which they depend.

For the reasons discussed above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance is earnestly solicited.

⁵ See Lee, at col. 25, lines 7-9.

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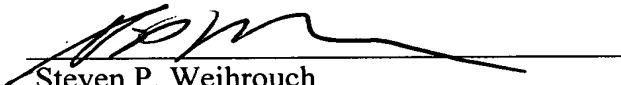
Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicant's undersigned representative at the below listed telephone number.

Respectfully submitted,

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